National Institute of Environmental Health Sciences

Climate change impact and adaptation assessment on food consumption utilizing a new scenario framework

Author(s): Hasegawa T, Fujimori S, Shin Y, Takahashi K, Masui T, Tanaka A
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Abstract:

We assessed the impacts of climate change and agricultural autonomous adaptation measures (changes in crop variety and planting dates) on food consumption and risk of hunger considering uncertainties in socioeconomic and climate conditions by using a new scenario framework. We combined a global computable general equilibrium model and a crop model (M-GAEZ), and estimated the impacts through 2050 based on future assumptions of socioeconomic and climate conditions. We used three Shared Socioeconomic Pathways as future population and gross domestic products, four Representative Concentration Pathways as a greenhouse gas emissions constraint, and eight General Circulation Models to estimate climate conditions. We found that (i) the adaptation measures are expected to significantly lower the risk of hunger resulting from climate change under various socioeconomic and climate conditions. (ii) population and economic development had a greater impact than climate conditions for risk of hunger at least throughout 2050, but climate change was projected to have notable impacts, even in the strong emission mitigation scenarios. (iii) The impact on hunger risk varied across regions because levels of calorie intake, climate change impacts and land scarcity varied by region.

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Resource Description

Climate Scenario :

specification of climate scenario (set of assumptions about future states related to climate)

Representative Concentration Pathway (RCP)

Representative Concentration Pathway (RCP) : RCP 2.6, RCP 4.5, RCP 6.0, RCP 8.5

Early Warning System:

resource focus on systems used to warn populations of high temperatures, extreme weather, or other elements of climate change to prevent harm to health

A focus of content

Exposure :

weather or climate related pathway by which climate change affects health

Ecosystem Changes, Food/Water Security, Temperature

Food/Water Security: Agricultural Productivity, Food Access/Distribution, Nutritional Quality

Temperature: Fluctuations

Geographic Feature: ☒

resource focuses on specific type of geography

None or Unspecified

Geographic Location: ☒

resource focuses on specific location

Global or Unspecified

Health Impact: ☒

specification of health effect or disease related to climate change exposure

Health Outcome Unspecified

Intervention: ☒

strategy to prepare for or reduce the impact of climate change on health

A focus of content

Mitigation/Adaptation: ☒

mitigation or adaptation strategy is a focus of resource

Adaptation

Model/Methodology: ☒

type of model used or methodology development is a focus of resource

Cost/Economic, Exposure Change Prediction, Methodology

Resource Type: ☒

format or standard characteristic of resource

Research Article, Research Article

Socioeconomic Scenario: Shared Socioeconomic Pathway (SSP)

Timescale: ☒

time period studied

Medium-Term (10-50 years)

Vulnerability/Impact Assessment: ☒

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content